

A Rich Picture of the Problem and Value Chain of Integrated Ciliwung Watershed Ecosystems Management and Restoration

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This research aims to discover the rich picture of problems that hinder the application of integrated watershed ecosystems management and restoration (WEMR) and to formulate the value chain in order to solve the problems of coordination and overlapping activities in the Ciliwung watershed. Rich picture analysis reveals three problems at the policy level, three problems at the organisational level, and four problems at the operational level. To achieve the strategic targets of Ciliwung WEMR, there are value chains that need to be conducted by: 1) enhancing the conservation area; 2) enhancing the hydraulic capacity; and 3) improving the water quality. These three can be accomplished by implementing: 1) sustainable spatial planning of the Ciliwung watershed and 2) institutional setup and community culture strengthening in the Ciliwung watershed. This research should be followed by further research, which studies the model of proper institutional design and collaboration of the actors in the Ciliwung WEMR.

Keywords: Ciliwung watershed, integrated watershed ecosystems management and restoration, rich picture, value chain

Introduction

Ciliwung is a strategic watershed which crosses the capital city of Indonesia, Jakarta. It is the largest and most flood-prone river in Jakarta (van Voorst 2016). Since the colonial era, the Ciliwung watershed has played a strategic role as a water transportation medium (Leirissa 1995). Currently, the Ciliwung watershed suffers from ecosystem degradation and water quality reduction as a result of land use change, sedimentation, waste, and garbage (Ministry of Environment 2011). The Ciliwung watershed has become a critical watershed and has been classified as a national priority (National Medium Term Development Plan 2015-2019).

Ciliwung is a cross-province watershed. Hence, it has high institutional complexity. It passes DKI Jakarta and West Java Province (Bogor Regency, Bogor City, and Depok City). As a consequence, there are various government agencies involved, ranging from national, provincial, and regency/city levels. The complexity increases with the presence of non-governmental organizations (NGOs) and private companies. Institutional complexity is causing the failure of Ciliwung watershed management because each actor works sectorally without coordination and synergy (Karyana 2007; Saridewi et al. 2014; Suwarno 2011). In order to improve the effectiveness, efficiency, and sustainability of Ciliwung WEMR, an integrated approach is needed, starting from upstream to downstream, through collective actions from the stakeholders.

A watershed is a unity of ecosystems. Thus, its management and restoration should be discerned as an all-round system, which is complex and dynamic. It covers physical and biological systems, as well as social systems that regulate the interactions of the actors (Maryono 2007). Hence, its management and restoration should not be partial or sectoral (Brookes & Shield 1996; Heathcote 1998; Maryono 2007). An integrated approach to watershed management encompasses: 1) harmony in the natural system, and 2) alignment towards the human system, which also covers other policy areas besides water governance, but includes the water management governance system (Helmi 2002, p. 40).

Existing research shows that watershed management in Indonesia is still partial (Karyana 2007; Suwarno 2011). The bureaucracy hitherto has not adopted the new paradigm “one river one management” (Wibowo 2013). WEMR can work well if there is coordination and harmony among central and regional governments. Coordination is important to prevent overlapping

TABLE 1
ACTORS IN CILIWUNG WEMR

Organisation		Unit	
Non-Executive Government	Legislative (DPR RI)	Commission IV, V, and VII	
	The Audit Board (BPK RI)	Member IV of BPK RI	
	Local Parliament (DPPRD) of DKI Jakarta Province	Commission D	
	DPRD of West Java Province	Commission IV	
	DPRD of Bogor Regency	Commission II and Commission III	
	DPRD of Bogor City	Commission C	
	DPRD of Depok City	Commission C	
Executive Government	National	Ministry of Environment and Forestry (MoEF)	Directorate General (DG) of Watershed Control and Protected Forest and DG of Pollution Control and Environmental Degradation
		Ministry of Public Works and Public Housings (MPWPH)	DG of Water Resource and DG of Human Settlements
		Ministry of National Development Planning	Deputy Minister for Maritime and Natural Resources
		Ministry of Finance	DG of Budget
		Ministry of Agrarian and Spatial/National Land Agency	DG of Spatial
	Province	DKI Jakarta	Governor, Deputy Governor for Spatial, Council of Water Resources, Local Development Planning Agency, Local Environmental Agency, Public Work Agency, Sanitary Agency
		West Java	Governor, Local Development Planning Agency, Local Environmental Agency, Public Work Agency, Forestry Agency
	Regency/ City	Bogor Regency	Regent, Local Development Planning Agency, Local Environmental Agency, Agriculture and Forestry Agency, Public Work and Water Resource Agency

TABLE 1
(CONTINUED)

Organisation			Unit
		Bogor City	Mayor, Local Development Planning Agency, Local Environmental Agency, Water Resource and Public Work Agency, Sanitary Agency, Gardening Agency
		Depok City	Mayor, Local Development Planning Agency, Local Environmental Agency, Public Work Agency, Sanitary Agency, and Gardening Agency
Non-Government	Interest Group	Private Company	Drinking Water Company of DKI Jakarta, PT. Palyja, PT. Aetra, and tofu industries
		NGO	Gerakan Ciliwung Bersih and Ciliwung Institute
		College/Research Center	Universitas Indonesia
		Grassroot	Bogor Regency: Pucak ORG, Farmer Group or <i>Kelompok Tani</i> (KT) Cijulang, KT Kaliwung Kalimuncar Cijulang Asri, KT Baru;
			Bogor City: Community Care of Ciliwung or <i>Komunitas Peduli Ciliwung</i> (KPC) Bogor;
			Depok City: KPC Bojong Gede and KPC Depok;
			DKI Jakarta: Search and Rescue (SAR) Karang Taruna Lenteng Agung, KPC Lenteng Agung, Komunitas Tanjung Barat, KPC Tanjung Barat, Komunitas Ciliwung Condet, KPC Buluh Cililitan, KPC Muara Cililitan, KPC Tanjungan, KPC Pejaten Timur, KPC Gemar Bersuci, KPC Timur, KPC Rawajati, Mat Peci, Komunitas Bidara Cina, and Komunitas Kebon Baru, Jakarta Green Monster
		International Actor	Ministry of Environment of South Korea and Korea International Cooperation Agency

SOURCE.—Authors, 2017

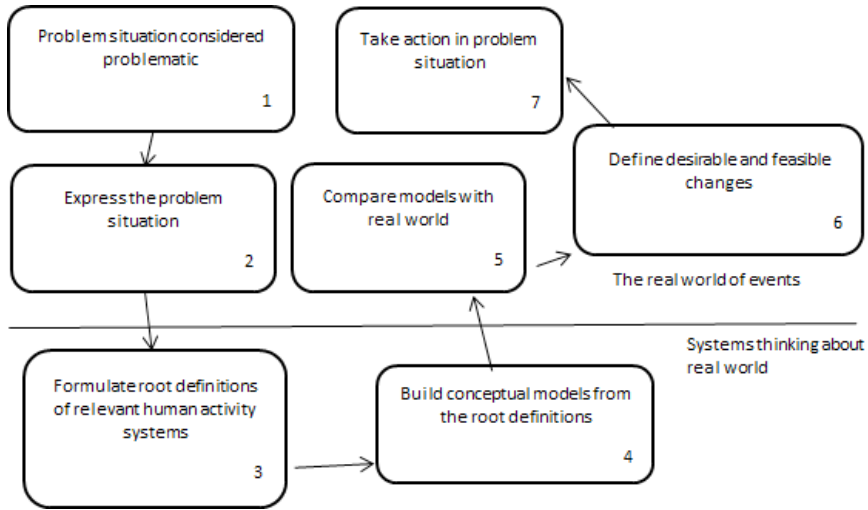
activities (Suwarno 2011). Furthermore, research by Saridewi et al. (2014) indicates that the key success of watershed management through an institutional approach is by allowing public participation because the watershed is a common resource.

A brief example of the coordination problem can be seen from different perceptions of the watershed among government agencies. Some agencies, such as MPWPH, perceive the watershed as a water resource. Hence, they exploit the watershed by building dams or concrete barriers. Other agencies, such as the MoEF, perceive the watershed as an ecosystem. They believe that watershed should be managed integratedly, from the upstream to the downstream (Suwarno 2011, p. 195). These different perceptions make the strategy and policy to manage the Ciliwung watershed difficult to integrate.

The Role of Rich Picture in Identifying the Messy Problem

This research aims to draw a rich picture of the problems related to Ciliwung WEMR. A rich picture is a problem expression based on SSM (Checkland 1999). It serves the function of illuminating problems structurally and clearly (Checkland & Poulter 2006). Rich picture serves as an analysis tool to identify problems that impede the integrated approach in the Ciliwung WEMR. SSM is derived from systems thinking, encompassing the basic ideas of emergence, hierarchy, control, and communication. In SSM, the problem domain is considered in a holistic rather than reductionist way, recognizing that the component parts are interconnected, such that a change in one part will affect the other parts (Camarinha-Matos & Afsarmanesh 2008, p. 169).

There are seven stages of SSM. These stages use the concept of human activity as a means of moving from finding out about the situation to taking action to improve the situation (Checkland 1981). The first stage is to capture the problematic situation through interviews with the problem owners. At the second stage, the researcher develops a rich picture to capture the various perceptions and the complexity of the problems. At the third stage, the researcher creates the root definitions using the mnemonic 'CATWOE' (Customer, Actors, Transformation, Weltanschauung, Ownership, and Environment). At the fourth stage, a conceptual model is created based on the problems identified. The fifth stage then compares the conceptual model with the real world. At the sixth stage, the researcher introduces the conceptual model to the related parties to receive correction. Finally, the seventh stage is implementing the model to resolve the research problem (Checkland 1999). Considering that the authors focus on developing a rich



SOURCE.—Checkland (1999, p. 163).

FIG. 1.—The Stages of SSM

picture, the research only uses stages 1 and 2 of the SSM stages. The full scheme of SSM can be seen in the figure 1.

The author argues that rich picture is the best analytical tool to identify the messy problem in Ciliwung WEMR. According to Frederiksen & Mathiassen (2005 cited in Lewis et al. 2007, p. 12), SSM performs four generic activities as an analytical tool. The first is *appreciating the situation*. It focuses on the contextual peculiarities and the perceptions of the stakeholders. The second is *capturing viewpoints*. The perceptions of the stakeholders are then captured as viewpoints, i.e., organized sets of human activities that are perceived to be meaningful and relevant in relation to the innovation context under consideration. The third is *debating with stakeholders*. This activity engages key stakeholders in a structured debate, in order to compare the captured viewpoints. The fourth is *identifying improvements*. The important purpose of SSM is to generate the improvements based on the problem identified.

In developing the rich picture, the authors use primary and secondary data. The primary data is collected through purposive in-depth interviews with 27 informants: a) 11 government officers, b) 3 members of DPR RI, c) 8 local government officers, d) 4 informants from NGOs, and e) 1 academic (University of Gadjah Mada). All informants are considered as problem

owners who know the issue well. The questions asked to the informants concern the problems that hinder the efforts to integrate the Ciliwung WEMR. Thus far, there is no research on a rich picture of river/watershed management, neither in Ciliwung nor other watersheds in Indonesia. Thus, this research contributes to river/watershed and/or governance studies.

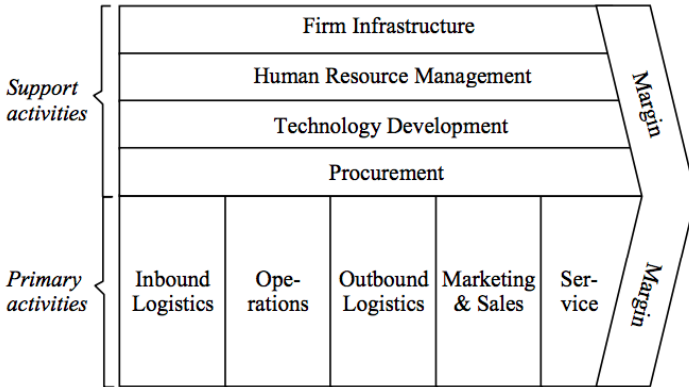
Value Chain for Organizational Competitiveness

Besides developing a rich picture, this research also aims to develop a value chain. A value chain is needed to determine and prioritize the strategy to resolve the problem; thereby, it helps to allocate resources efficiently and effectively, as well as makes it easy to manage the actors. A value chain is useful in dealing with the problems of coordination, transparency, and overlapping activities (Porter 1985; Laguna & Marklund 2005). Here, the value chain acts as a theoretical tool that helps to find solutions regarding overlapping programs by government or private agencies in the Ciliwung WEMR.

The concept of the value chain came from business management and was first described and popularized by Michael Porter in his 1985 best seller, *Competitive Advantage: Creating and Sustaining Superior Performance* (Rapcevičienė 2014, p. 43). Since 1990, major trends have changed the supply chain into an integrated value chain. The concept of the value chain was introduced to enable supply chain successes to incorporate value (Sand 2010, p. 14). For private companies, a value chain disaggregates a firm into its strategically relevant activities in order to understand the behavior of costs and the existing and potential sources of differentiation (Kannegiesser 2008, p. 11).

The adoption of the value chain concept also offers new ideas for the science of public administration. Similar to business, public services should have high quality and cost effectiveness to meet public satisfaction. Public organizations, therefore, create 'public value' through services they provide (Moore 2013; Rapcevičienė 2014, p. 43). The concepts of competitive strategy and value chain can consequently be referred to as public services organizations, as they represent the mirror of the entire process of service creation and management (Alberto 2013, p. 87).

The value chain elaborates the activities within and around an organization and analyzes them in terms of competitive strengths. Porter's value chain consists of a "set of activities that are performed to design, produce and market, deliver and support its product." Porter (1985) divides



SOURCE.—Porter (1985)

FIG. 2.—Value Chain

primary activities and support activities. Primary activities are the creation of a product/service. Each primary activity is then complemented by support activities to improve effectiveness and efficiency. The flow of the value chain is depicted in the figure 2.

In developing the value chain, the developer must first analyze the interconnectedness among activities. This analysis is important to discovering the overlapping activities by the actors. The authors use a causal loop diagram from field observation and literature study. A causal loop is a closed sequence of causes and effects, which is a closed path of action and information (Richardson & Pugh 1981). The literature used includes, Report on Ciliwung River Plan (Ministry of Environment/MoE 2012); Action Plan on Water Quality Enhancement of Ciliwung Watershed (Local Environmental Agency of DKI Jakarta 2011); Master Plan on Pollution Control and River Water Quality Restoration in DKI Jakarta (Local Environmental Agency of DKI Jakarta 2012); Integrated Watershed Management Plan (Ministry of Forestry/MoF 2013); and interview results. The authors verify the analysis through FGD with 11 participants: a) 4 government officials, b) 1 participant from the local government, c) 3 academics, and d) 3 participants from NGOs.

The Problems in the Ciliwung WEMR

The rich picture and value chain are designed based on the true problems in the Ciliwung watershed. The research findings indicate two types of

problems that hinder the enhancement of Ciliwung watershed quality: 1) the social-ecological problem and 2) the policy problem.

1) Social-Ecological Problems

Social-ecological problems are related to social aspects and the mutual relationship between environment and human. There are five social-ecological problems identified which cause Ciliwung watershed degradation. The first problem is ecological damage to the Ciliwung watershed. Field observation shows environmental degradation in the Ciliwung watershed from the upstream to downstream area. In the last ten years, the Ciliwung watershed has lost 3,673 hectares (7.04 percent) of its forest area (MoF 2013). Approximately 70 percent of the watershed area has become a settlement area; only 9 percent remains forest area. The land-use change is affected by agriculture, industry, and settlement needs. Land-use change also reduces biodiversity in the Ciliwung watershed, in which 92 percent of fish and 66.7 percent of mollusks, shrimp, and crab have become extinct (MoE 2012).

The second problem is spatial planning violations in Ciliwung watershed. In the upstream, especially in Bogor Regency, spatial planning violations can be seen in illegal buildings. The upstream area, which functions as water catchment, has been converted to serve other functions, such as tourism. Meanwhile, in the mid-stream and downstream areas, spatial planning violations are shown in non-procedural buildings on the riverbank. In DKI Jakarta Province, there are 1,185 non-procedural buildings on the Ciliwung riverbank (DKI Jakarta Provincial Government 2012).

The third problem is the reduction of Ciliwung River water quality. The water quality upstream is relatively good, but the water quality in the middlestream and downstream has decreased significantly. The reduction of water quality is also presented by several studies, where water quality of the Ciliwung River is categorized from “mildly polluted” to “heavily polluted” (Facility Center for Environmental Impact Assessment 2011). The main cause of this water quality decrease is poor management of domestic and industrial waste.

The fourth problem is the increase of water destructive power of the Ciliwung River. The Ciliwung River today is losing its hydraulic capacity. It only has the capacity of 100-300 m³/second. Ideally, the capacity should be 570-600 m³/second (Ministry of Public Works, 2013). The data analysis shows that the increase of water destructive power is caused by: a) the shrinking of the water catchment area, b) the narrowing of the river body, c) garbage on the river body, and d) sedimentation caused by erosion.

The fifth problem is low public awareness and participation. Low public awareness and participation are due to: a) low public understanding regarding the necessity of the Ciliwung watershed; b) ineffective socialization from the government because of the dissolution of programs and limited infrastructure; (c) low sense of ownership from the public toward the efforts of the Ciliwung WEMR. These factors emerge because the government rarely involves the public in the planning, implementation, monitoring, and evaluation processes.

2) Policy Problems

Based on the data analysis, these social-ecological problems happen because of policy problems. Policy problems are related to the structures and processes of the political, government, and social institutions. There are nine policy problems that have been identified by the authors based on interview results, FGD, literature study, and direct observation: 1) the absence of shared vision among actors, 2) the current policy which is still using a sectoral approach, 3) the fact that Ciliwung WEMR has not been a political priority, 4) conflict of interest among actors, 5) low commitment of government agencies to conduct an integrated Ciliwung WEMR, 6) ineffective institutional arrangement for policy implementation, 7) overlapping and sporadic activities in the field, 8) low awareness of the actors of collective work, and 9) low capacity for collaboration among the actors. These nine policy problems are then analyzed and modified further by the authors into a rich picture.

Rich Picture of the Problems in the Ciliwung WEMR

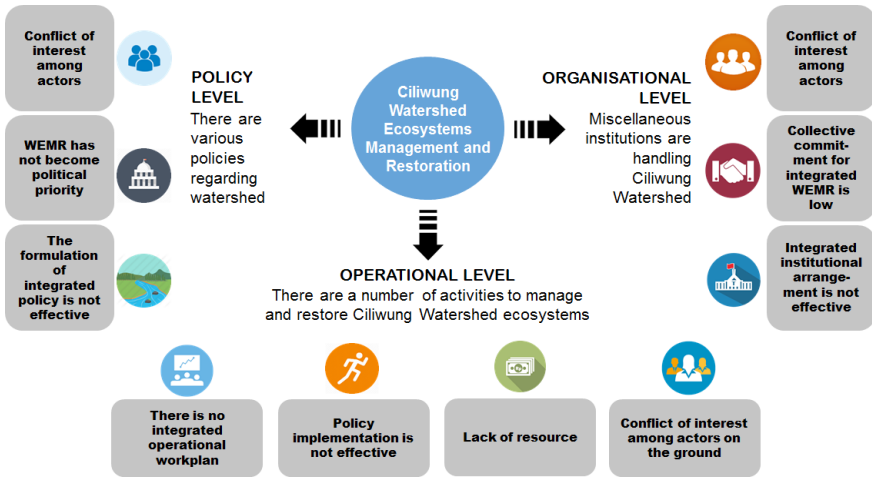
The identification of policy problems in Ciliwung WEMR and SSM-based analysis regarding the perceptions of the actors help the authors draw the rich picture. In developing the rich picture, the authors use the theory of policy hierarchy from Bromley (1989). According to this theory, there are three levels in policy hierarchy: 1) the policy level, which is a process to discuss the vision or future expectation, which is then formulated into a regulation; 2) the organisational level, which is a process to develop organisational capacity and rules in order to follow up on the vision at the policy level; and 3) the operational level, at which the interactions and actions produce outcomes which affect the public. The actions and choices at operational level are confined by institutional arrangements at the policy level and the organisational level.

In developing the rich picture, the authors use three kinds of analysis to obtain the perceptions of the actors. The first analysis is intervention analysis, which is conducted to identify the key actors related to the problem. The client in this research is the government (MoEF). The majority of informants agree that MoEF is the most appropriate institution to lead the Ciliwung WEMR based on the following considerations: a) mandate/authority in managing environment using an integrated approach, and b) the MoEF has instruments to coordinate various government agencies related to environmental affairs. Another actor who could be the leader of the Ciliwung WEMR is MPWPH because of its substantial budget.

The second analysis is social analysis. There are three elements for conducting social analysis. The first is the role element. The actors in the Ciliwung WEMR have not performed their roles optimally. Relational work among government agencies, community, and the private sector is relatively weak. The actors do not have a master plan that is agreed upon collectively as a work reference. Each actor, especially the government, focuses on their specific role and does not view the watershed comprehensively.

The second element of social analysis is norms. The main norm prevailing in the Ciliwung WEMR is legal norm. The legal norm regulates the authority and actions of each actor. At the organisational level, there are several legal instruments related to the watershed, including: a) Law Number 32/2009 on Protection and Management of Environment; b) Law Number 26/2007 on Spatial Planning; c) Law Number 41/1999 on Forestry; d) Law Number 37/2014 on Soil and Water Conservation; e) Government Regulation (GR) Number 38/2011 on the River; and f) GR Number 37/2012 on Watershed Management. At the operational level, the actions of the actors are regulated by Local Law issued by provincial and regency/city governments. The actors have not been capable of effectively enforcing the legal norms. This can be seen from the violation of spatial planning laws or the encroachment of conservation areas in the Ciliwung watershed. In addition, at the organisational and operational levels, the actors still partially manage the Ciliwung watershed, whereas GR Number 37/2012 mandates that watershed be managed integrately.

The third element of social analysis is values. Research results show that the informants deem that leadership is an important value to endorse for the Ciliwung WEMR. Nevertheless, there has been no prominent leader thus far. MoEF as the main leader of the Ciliwung WEMR has not performed optimally in its leadership capacity because of budget constraints. The absence of strong leadership at the policy and organisational levels leads to



SOURCE.—the authors based on research findings.

FIG. 3.—Rich Picture of Ciliwung WEMR

only partial management of the Ciliwung WEMR at operational level. So far, the programs of the actors are short-term and project oriented. Thus, they are not able to solve the problem.

The third analysis is political analysis. At the policy level, political initiatives from DPR RI to endorse the Ciliwung WEMR are relatively weak. The Ciliwung WEMR has not become a political agenda. Hence, it is not a priority policy. In DPR RI, there are three commissions which handle the watershed: commission IV (forestry affairs), V (water resource affairs), and VII (environmental affairs). There has never been a joint meeting involving the commissions that specifically discuss the watershed. Low political commitment eventually results in a small budget for watershed management. Based on this analysis, the rich picture in Ciliwung WEMR can be depicted in the figure 3.

The rich picture gives both a holistic perspective and contextualization of the problem situation. It makes us understand the real problems. In addition, the policy hierarchy theory makes the rich picture more detailed. The above rich picture reveals the institutional complexity, poor interaction and coordination, and the difficulties with collaboration among the actors. The rich picture asserts how messy the problems are for the Ciliwung WEMR. There are ten problems presented in the rich picture. At the policy level, three problems can be identified, as follows.

Conflict of Interest among Actors

Water-related policies, including those related to the Ciliwung WEMR, require political decisions by the actors (executive and legislative). Nevertheless, the involvement of political and executive actors implies the problem of conflicts of interest. These conflicts of interest are caused by: a) conflicts of interest among legislative members in different commissions, because each commission has different scopes, working partners, and political interests; and b) the executive branches of government have more comprehensive and long-term goal orientations, while the legislative branch is more short-term oriented and focused on constituents.

WEMR Has Not Become a Political Priority

Any public policy, including the Ciliwung WEMR, needs political support to ensure its effectiveness. Political support especially comes from the legislature and should be complemented by the government's commitment to support. Political support is needed because it determines the scope of authority and budget allocation. The authors conclude that the Ciliwung WEMR has not been a political priority because of: a) low commitment from the legislature to develop policies on watersheds; b) the fact that the Ciliwung WEMR has not been a significant part of the public agenda/ low policy legitimation regarding the watershed; and c) insignificant budget allocation.

The Formulation of Integrated Policy is not Effective

Conflict of interest and low political commitment at policy level eventually induce the failure in formulating an integrated policy. An integrated policy is needed as guidance for institutional arrangement at the organisational level and actions at the operational level. Frequently, programs could not be implemented because there was no legal protection at the policy level. Field observation also indicates that discussions about the river/watershed among the legislative and executive branches of governments focus on flood problem. They do not discuss other issues, such as forest conservation. This happens because the actors are not aware of how to restore watershed function through an integrated approach.

At the organisational level, there are three problems identified, as follows:

Conflict of Interest among Actors

Similar to the problem at the policy level, conflicts of interest also happen at the organisational level. There are so many government agencies, ranging

from national to local, that handle the Ciliwung WEMR. Conflicts of interest occur because each agency has different authorities, interests, and concerns. Research results show that each actor, especially from the government, sees the watershed sectorally. As an example, MoEF views the watershed as a conservation area, meanwhile the local governments conceive that they have a right to conduct development activities in watershed areas.

Collective Commitment for Integrated WEMR is Low

The sectoral approach is a real evidence of low commitment among government agencies to conduct an integrated Ciliwung WEMR. The policies are still short-term oriented and not sustainable. Each actor formulates their policy without coordinating with other agencies. Eventually, low commitment for integrated approach does not result in a strategic plan of integrated Ciliwung WEMR approved by all actors, and thus the formulation of the Ciliwung WEMR plan and strategy remains sectoral.

Integrated Institutional Arrangement is not Effective

Low commitment for an integrated Ciliwung WEMR leads to an ineffective institutional arrangement. That problem occurs because of: a) the unavailability of an institution for integrated Ciliwung WEMR, as well as the specific role of each government agency; and b) the unavailability of an initiator or conductor who endorses integrated Ciliwung WEMR policy through collaboration among actors. For example, the Draft of Presidential Regulation on Classification and Water Pollution Control of Ciliwung River, which aims to strengthen institutional capacity and has been initiated since 2011, has not been agreed upon by the related ministries until now.

At the operational level, the authors have identified four problems:

There is no Integrated Operational Workplan

The problem of the Ciliwung watershed should be addressed by a comprehensive workplan. Nevertheless, the existing policy is still sectoral without the presence of an integrated operational workplan that is agreed by all actors. As a result, each actor only focuses on their responsibility and mandate. For example, the MPWPH focuses on the management of water destructive power, corresponding with Law Number 11/1974 on Watering. On the other hand, the MoEF concerns itself with the rehabilitation of conservation areas in the watershed, suitable with the mandate, such as Law Number 41/1999.

Policy Implementation is not Effective

Thus far, many activities have been implemented by government agencies, but the impact is not significant. Each agency implements its activities sporadically and without coordinating with other agencies. Eventually, this causes overlapping programs. For example: a) land acquisition efforts to normalize the Ciliwung River were hindered by overlapping land administration policies in DKI Jakarta Province; and b) Ciliwung riverbank greening by MoEF was interrupted because of an MPWPH plastering program. The activities were also not implemented routinely. Rather, they were implemented only on certain occasions.

Lack of Resources

Low awareness for collective work is reflected in the limited resources for policy implementation. Lack of resources occurs because each actor has not built the willingness to share resources through a collective work mechanism. Resource sharing, especially funding, is important to restore the degraded Ciliwung watershed. This funding cannot be borne by only one agency. Field findings show that some government agencies are not willing to share their budget. It indicates that there is no collective work on a large scale among actors in the Ciliwung WEMR.

Conflict of Interest among Actors on the Ground

Conflict of interest at the operational level is a consequence of conflict of interest at the policy and organisational levels. At the operational level, conflicts of interest become more diverse with the presence of NGOs and private organizations. Some actors on the ground frequently have adverse interests. They claim to have the best way to restore the Ciliwung watershed. For example, sheet pile programs from the MPWPH and DKI Jakarta provincial government are always opposed by NGOs (Ciliwung Institute and Walhi). The government claims that sheet pile is an effective way to manage flooding, while the NGOs argue that sheet pile would degrade the ecosystem.

The Interrelation of Activities and Value Chain in the Ciliwung WEMR

Before formulating the value chain, the analysis of activity interrelation should be performed. The activity interrelation developed in this research is built upon the strategic goal. By knowing the strategic goal, the authors can identify the required activities efficiently, effectively, and properly. Therefore, the following steps analyze activity interrelation in strategic goal achievement: 1) determine the strategic goals (output); 2) then, interactively

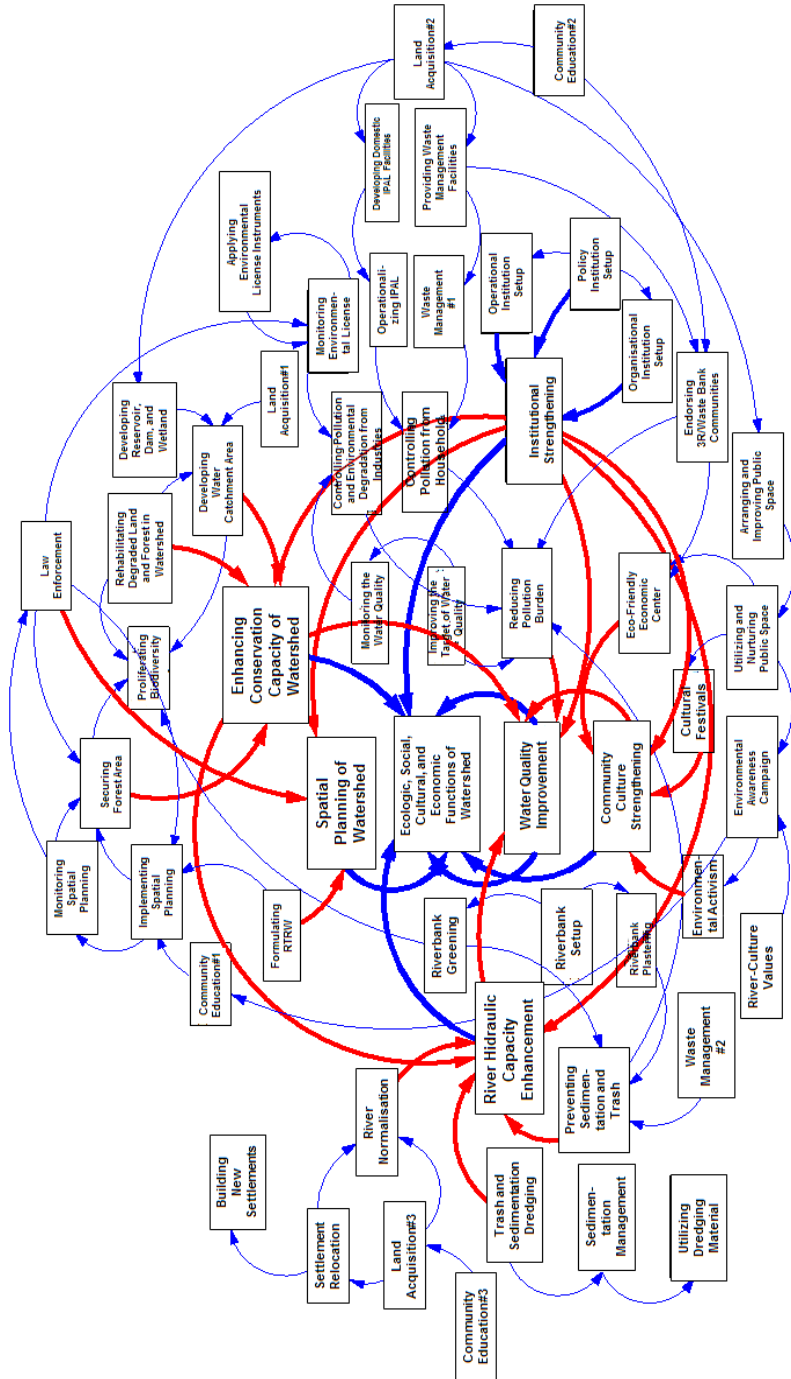


Fig. 4.—Rich Picture of Ciliwung WEMR

determine the activities and sub-activities (input) to achieve the strategic goals; and 3) analyze the interrelation of the activities in a chain (process).

The authors view that the strategic goal in the Ciliwung WEMR is a restoration effort of the watershed function, not an effort to restore the functions to their natural condition. Pragmatically, it is easier to restore the watershed functions. The authors conclude that the strategic goal of Ciliwung WEMR is the restoration of ecological, social, cultural, and economic functions, according to Law Number 32/2009. Therefore, the Ciliwung watershed should function, *inter alia*, as a conservation area for water and biodiversity, a water resource, the controller of flood and water destructive power, and a public space for social, cultural, and economic activities. The analysis of activity interrelation in the Ciliwung WEMR can be seen in the figure 4.

From Figure 4, it can be seen that water quality enhancement through the reduction of the pollution burden could improve the ecological, social, cultural, and economic functions of the Ciliwung watershed. Good ecological, social, cultural, and economic functions could maintain the water quality of the Ciliwung River also. The process of subsystems strengthening also occurs in other subsystems, such as conservation area enhancement, spatial planning, and cultural strengthening. Consequently, it can be concluded that strong connectivity among activities, high dynamics and complexity, large scale activities, and actor diversity reinforce some ideas which suggest that the Ciliwung WEMR should be conducted systemically and in an integrated approach.

Based on the analysis, the strategic goals could be achieved through: 1) the enhancement of conservation capacity in the Ciliwung watershed; 2) the enhancement of the Ciliwung River hydraulic capacity; and 3) the improvement of Ciliwung River water quality. These three primary activities should be endorsed by two support activities: 1) sustainable spatial planning of the Ciliwung watershed; and 2) institutional setup and community culture strengthening. The three primary activities are basically technical projects. Meanwhile, the two support activities are managerial, which make the primary activities effective and efficient. The authors describe completely the sectoral activities that have been performed by government agencies and then simplify them into five integrated activities. The flow of value chain in Ciliwung WEMR is depicted in the figure 5.

The Enhancement of Conservation Area in Ciliwung Watershed

The conservation area is needed to ensure soil, water, and biodiversity

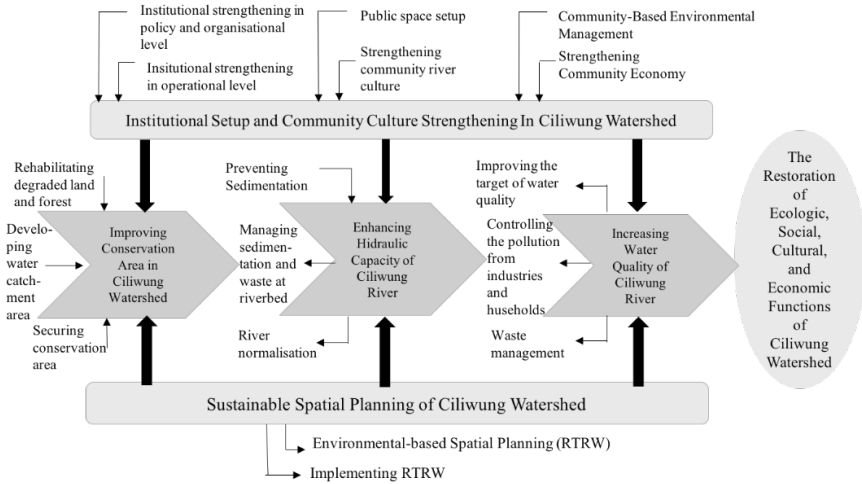


FIG. 5.—Value Chain of Ciliwung WEMR

conservation. Soil and water conservation capacity is required to ensure water supply, both in dry and rainy seasons. Biodiversity plays a role as a buffer. Some steps required to ensure the conservation effort include: a) securing the conservation area in the Ciliwung watershed, through education of the community, supervision, and law enforcement; b) developing water catchment area to conserve soil and water, through the establishment of reservoirs, biopori, and wetlands; and c) rehabilitating critical land and forests in the Ciliwung watershed.

The Enhancement of Hydraulic Capacity of the Ciliwung River

The hydraulic capacity of the Ciliwung River can control water quantities to reduce water destructive power and increase positive benefits of the water. One reason for the flooding in Jakarta is the low hydraulic capacity of the Ciliwung River. To overcome this problem, the Ciliwung River hydraulic capacity should be maintained at least 570-600 m³/second (Ministry of Public Works, 2013). Some steps to enhance the hydraulic capacity include: a) prevention efforts, that is, reducing sedimentation from erosion; b) dredging the sediment and garbage on riverbed; and c) river normalization, conducted to increase hydraulic capacity.

The Improvement of Ciliwung River Water Quality

To improve water quality, the pollution burden in the Ciliwung watershed

should be reduced. There are four steps to control the pollution burden: a) specifying targets for Ciliwung River water quality through water quality classification; b) controlling pollution from industries through socialization, waste disposal licenses, license supervision, and environmental law enforcement; c) controlling pollution from households through community education, establishing waste processors, training in garbage processing, providing waste infrastructure, and further garbage management; and 4) continuously supervising the water quality.

Sustainable Spatial Planning of the Ciliwung Watershed

Research results show that spatial planning is a crucial aspect to assure the effectiveness of the Ciliwung WEMR. Spatial planning is the main reference for all actors, especially government agencies, in formulating policies. The data show spatial utilizations in the Ciliwung watershed that are not suitable to its carrying capacity. Integrated spatial planning is a solution to ensure the sustainability of ecological function. Some steps to protect the carrying capacity of the Ciliwung watershed through spatial utilization include formulating a Regional Spatial Plan (RTRW) for the Ciliwung watershed, which highlights the carrying capacity of the Strategic Environmental Assessment, and the implementation of RTRW, which should be complemented with community education, spatial supervision, and law enforcement for spatial violations.

Institutional Setup and Community Culture Strengthening in the Ciliwung Watershed

Besides the sustainable spatial plan, the effectiveness of the value chain is determined by a proper institution and public awareness. A proper institution could reduce overlapping programs and conflicts of interest because there are norms and values that regulate behavior. Institutional strengthening should be conducted at the policy level, organisational level, and operational level. In line with institutional setup, community culture strengthening is required to improve public awareness, individual active roles, and social cohesion, which encourage collective awareness. There are four activities to strengthen community culture: a) a riverbank setup based on green space, which involves the community; b) cultural strengthening of the Ciliwung riverbank through social, cultural, and economic activities; c) social cohesion, which is improved by managing the environment and initiating community-based activities in Ciliwung riverbank; and d) economic development of the riverbank residents in order to give them

alternative sources of income.

Conclusion

Rich picture analysis helps the authors identify messy problems that impede Ciliwung WEMR in an integrated manner. Based on the analysis of actors' perceptions and policy hierarchy theory (Bromley 1989), the authors draw a rich picture to express the problems. At the policy level, there are three problems: 1) conflicts of interest among actors, 2) that watershed restoration has not become a political priority, and 3) the implementation of strategic policy which is not effective. At the organisational level, there are three problems: 1) conflicts of interest among actors, 2) low collective commitment for integrated watershed management, and 3) ineffective integrated institutional arrangement. Furthermore, at the operational level, there are four problems: 1) no integrated operational workplan, 2) ineffective policy implementation, 3) lack of resources, and 4) conflicts of interest among actors on the ground.

To achieve the strategic goal of Ciliwung WEMR requires a value chain in the form of: 1) the enhancement of conservation areas in the Ciliwung watershed; 2) the enhancement of the Ciliwung River's hydraulic capacity; and 3) the enhancement of the Ciliwung River's water quality. Those three should be supported by: 1) sustainable spatial planning of the Ciliwung watershed, and 2) institutional setup and community culture strengthening. From the value chain analysis, it can be inferred that there is a strong interrelation among activities. It reflects that the Ciliwung WEMR is a system and should be conducted in an integrated approach. A value chain analysis beneficially helps the authors manage and link overlapping activities and simplify them into five integrated activities. It is beneficial for public officials to design better policies regarding the Ciliwung WEMR because the value chain provides a more focused and integrated policy. This research should be followed by further research that studies the model of proper institutional design and collaboration of actors in Ciliwung WEMR. The institutional design and collaborative model are needed to make sure that the activities in the value chain could be implemented effectively.

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References

- Bromley, D. W. 1989. *Economic Interests & Institutions: The Conceptual Foundation of Public Policy*. Oxford: Basil Blackwell.
- Brookes, A. and Shield, F. D. Jr. 1996. "Perspective on River Channel Restoration." Pp. 1-19, in *River Channel Restoration: Guiding Principles for Sustainable Projects*, edited by A. Brookes & F.D. Shield, Jr. Chichester: John Wiley & Sons.
- Camarinha-Matos, M. Luis and Hamideh Afsarmanesh. 2008. "A Survey of Soft Modeling Approaches for Collaborative Networks", Pp. 165-190, in *Collaborative Networks: Reference Modeling*, edited by Luis M Camarinha-Matos & Hamideh Afsarmanesh. New York: Springer.
- Checkland, Peter. 1981. *Systems Thinking, Systems Practice*. Chichester: John Wiley & Sons.
- _____. 1999. *System Thinking, System Practice: Includes a 30-Year Retrospective*. Chichester: John Wiley and Sons, Ltd.
- Checkland, Peter and John Poulter. 2006. *Learning for Action: A Short Definitive Account and Soft System Methodology and Its Use for Practitioners, Teachers and Students*. Chichester: John Wiley and Sons, Ltd.
- DKI Jakarta Provincial Government. (2012, February 10). *Ten Thousand Residents are Evacuated*. Retrieved February 16, 2017 from DKI Jakarta Province official website <http://www.jakarta.go.id/v2/statrec/detail/1921>.
- Facility Center of Environmental Impact Control. 2011. *Report on River Water Quality Monitoring*. Jakarta: Ministry of Environment.
- Government Regulation Number 38 Year 2011 on River. Pub. L. No. 74 (2011).
- Government Regulation Number 37 Year 2012 on Watershed Management. Pub. L. No. 62 (2011).
- Heathcote, I. W. 1998. *Integrated Watershed Management: Principles and Practice*. New York: John Wiley & Sons, Inc.
- Helmi. 2002. "The Challenge of Integrated Water Management in Indonesia." In *the Opportunity and Challenge of Water Management in Indonesia*, edited by S. P. Nugroho, S. Adi & B. Setiadi. Jakarta: P3-TPSLK BPPT & HSF.
- Kannegiesser, Matthias. 2008. *Value Chain Management in the Chemical Industry: Global Value Chain Planning of Commodities*. Berlin: Physica-Verlag Heidelberg.
- Karyana, A. 2007. *Position and Institution Role Analysis and Institutional Development in Ciliwung Watershed* (Doctoral dissertation). Available from DSpace database. Retrieved March 10, 2017 from <http://repository.ipb.ac.id/handle/123456789/46564>.
- Laguna, M. and Marklund, J. 2005. *Business Process Modeling, Simulation and Design*. New Jersey: Prentice Hall.
- Law Number 11 Year 1974 on Watering. Pub. L. No. 65 (1974).
- Law Number 41 Year 1999 on Forestry. Pub. L. No. 167 (1999).

- Law Number 26 Year 2007 on Spatial Planning. Pub. L. No. 68 (2007).
- Law Number 32 Year 2009 on the Protection and Management of Environment. Pub. L. No. 140 (2009).
- Law Number 37 Year 2014 on Soil and Water Conservation. Pub. L. No. 299 (2014).
- Leirissa, R. Z. 1995. *Sunda Kelapa as Silk Road Port: Collection of Discussion Paper*. Jakarta: Ministry of Education and Culture.
- Lewis, M. et al. 2007. "Business Process Innovation Based on Stakeholder Perceptions." Pp. 7-28, in *Work, Workflow, and Information Systems*, edited by William Rouse & Andrew Sage. Amsterdam: IOS Press.
- Local Environmental Agency of DKI Jakarta Province. 2011. *Action Plan of Ciliwung River Quality Enhancement 2011*. Jakarta: Local Environmental Agency of DKI Jakarta Province.
- _____. 2012. *Academic Research of the Master Plan of Pollution Control and River Water Recovery 2012*. Jakarta: Local Environmental Agency of DKI Jakarta Province.
- Maryono, Agus. 2007. *River Restoration*. Yogyakarta: Gadjah Mada University Press.
- Ministry of Environment. 2011. *The Mapping and Assessment of Pollution Burden from Household in Ciliwung Watershed Area of DKI Jakarta, Depok City, Bogor City, and Bogor Regency*. Jakarta: Ministry of Environment.
- _____. 2012. *Report on Ciliwung River Management Plan*. Jakarta: Ministry of Environment.
- Ministry of Forestry. 2013. *Integrated Ciliwung Watershed Management Plan*. Jakarta: BPDAS Citarum-Ciliwung.
- Ministry of Public Works. 2013. *The Project for Capacity Development of Jakarta Comprehensive Flood Management in Indonesia: Technical Cooperation Report Comprehensive Flood Management Plan*. Jakarta: JICA-Yachiyo Engineering Co. Ltd.
- Moore, M. H. 2013. *Recognizing Public Value*. Massachusetts: Harvard University Press.
- Porter, Michael. 1985. *Competitive Advantage: Creating and Sustaining Superior Performance*. New York: Free Press.
- Presidential Regulation Number 2 Year 2015 on National Medium Term Development Plan 2015–2019. Pub. L. No. 3 (2015).
- Rapcevičienė, Daiva. 2014. "Modeling a Value Chain in Public Sector." *Social Transformation in Contemporary Society* 2014(2): 42-49.
- Richardson, G. P & Pugh III, A. L. 1981. *Introduction to System Dynamics Modeling with DYNAMO*. Massachusetts: Productivity Press.
- Sand, Claire M. K. 2010. *The Packaging Value Chain*. Pennsylvania: DEStech Publications, Inc.
- Saridewi, T. R. et al. 2014. "Ciliwung Watershed Spatial Planning Using Institutional Approach in the Perspective of Agribusiness Management." *Agro Economy Research Forum* 32(2): 87–102.

- Suwarno, J. et al. 2011. *Policy Development of Sustainable Management of Upper Ciliwung Watershed, District Bogor* (Doctoral dissertation). Available from IPB Repository, DT - Multidisciplinary Program [523].
- Van Voorst, R. 2016. "Formal and Informal Flood Governance in Jakarta, Indonesia." *Habitat International* 52(2016): 5-10.
- Wibowo, L. R. 2013. "The Analysis of Public Policy on the Development of Ciliwung Watershed Compensation Institution." *Journal of Human and Environment* 20(3): 353-366.

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